

Section Three presented a research design with problem domains and research hypotheses that was intended to guide the investigations at Sites 5LR9949, 5LR9961, and 5LR9974, and to interpret construction patterns for Horsetooth Dams and Reservoir. Abundant data have been gathered from the project areas that should permit the resolution of at least some of these questions. If questions cannot be answered because of absent or insufficient data, the conclusions at least provide some direction for future research.

The following regional socioeconomic themes were identified as relevant to this research:

- Stone Quarrying (1870-1920)
- Farming and Ranching (1860-1940)
- Irrigation (1859-1959)

It is acknowledged here that these themes do not apply directly and uniformly to all three sites or the problem of construction patterns. The stone quarrying theme is directly applicable to 5LR9949, the quarry site, but is at best only indirectly applicable to Sites 5LR9961, the trash dump, and 5LR9974, the Wathen Ranch. Likewise, the farming and ranching theme applies directly to the Wathen Ranch (5LR9974) and possibly the dump (5LR9961), but not the quarry site (5LR9949). The irrigation theme applies best to the interpretation of construction patterns. With these caveats in mind, the problem domains and research hypotheses can be examined.

6.1 STONE QUARRYING (1870-1920)

As discussed in Section Three, stone quarrying was the predominant industry in this area through the end of the nineteenth century and early first couple of decades of the twentieth century. Direct and indirect evidence of quarrying is plentiful in the area now occupied by Horsetooth Reservoir. Site 5LR9949 is an excellent example of this theme, with an actual quarry and associated structures of indeterminate function. This site provides the focus of the following discussion, even though relevant findings for Sites 5LR9961 and 5LR9974 can also be discussed.

6.1.1 Problem Domain 1: Chronology

The land on which Site 5LR9949 is found was part of the homestead entry patent filed by Eugene Lamb (Patent No. 117524) on March 10, 1910. If it takes five years to prove up a patent (i.e., live on the land and improve it), then the earliest that Lamb, or any of his associates, could have been present on the site was 1905. The Fort Collins, Colo. 15' USGS topographic quadrangle map (Edition of 1908, but surveyed in 1905-1906) shows no buildings at the location of the site. Temporally diagnostic artifacts recovered from various areas of the site have the following age ranges:

<u>Location</u>	<u>Age Range</u>
Surface	1915-1916
Room 7	1920-1934
East of Room 7	1920-1951
Trench 150-160 East	1885-1951
Trench 170-180 East	1887-1934
Trench 2	1917-1949

For the site in general, these age ranges overlap at 1920-1934, which may be interpreted as the period of most intensive activity at the site.

The land on which the trash dump, 5LR9961, is located was part of the cash entry patent filed by Annie C. Kane (Patent No. 40456) on November 29, 1888. As one might expect of a trash dump, whose use was probably intermittent, the 1908 edition (surveyed 1905-1906) of the Fort Collins, Colo. 15' topographic quadrangle map shows no structures at this location. Despite the transitory use of this location, a sizable number of temporally diagnostic artifacts were recovered. The artifact age ranges by excavation level are as follows:

<u>Provenience</u>	<u>Artifact Age Ranges</u>
Surface	1915-1935
Level 1	1929-1948
Level 2	1927-1949
Level 3	1916-1929
Level 4	1886-1917

With the exception of the artifacts from the surface—which, not surprisingly, exhibit a mixture of dates—the interpreted age ranges of artifacts found in the dump generally increase with depth, i.e., the older artifacts are found at the bottom. This relationship appears to be incremental, suggesting that these artifacts accumulated gradually over period of about 50 years. The mean age range for all artifacts is 1922-1941.

The land on which the Wathen Ranch, 5LR9974, is located was part of the homestead entry patent filed by Stephen A. Wathen (Patent No. 40544) on October 23, 1894. Historical records indicate that the Wathen Ranch was established in 1887 (Wathen 1936). The Wathens built a two-story stone farmhouse and raised cows chickens, corn, wheat, and garden vegetables, and produced milk and butter. When the post office at the Stout boarding house closed in ca. 1882, it was eventually moved to the Wathen Ranch, where Stephen Wathen served as postmaster until the office was closed in 1908. This location is labeled on the 1908 edition (surveyed 1905-1906) of the Fort Collins, Colo. 15' topographic quadrangle map as “Stout” and shows two buildings and roads. A topographic map of the area, which was created probably in the 1940s before the construction of the Horsetooth Dams, shows several buildings at this location, including a stone shed, stone house, a one-story frame house, two barns, feed shed, cow shed, fences, cultivated fields, telephone lines, and roads. A small number of diagnostic artifacts were recovered from the site. The initial mean date for these artifacts is 1895 and the initial final date is 1920. These age ranges obviously capture just the earlier years of the site’s occupation.

Research Hypothesis 6.1.1.1: Site 5LR9949 was built and occupied during the heyday of stone quarrying in the Horsetooth Valley, ca. 1880-1900.

Results: Rejected. The buildings and perhaps the quarry were not established until after 1908. The interpreted age ranges of diagnostic artifacts overlap at ca. 1920-1934. However, it is possible that buildings were re-used after the quarry era by occupants of a nearby farm complex.

Research Hypothesis 6.1.1.2: A single dump episode is represented at Site 5LR9961 and it is principally associated with the more intense period of stone quarrying in the valley, ca. 1880-1900.

Results: Rejected. Although the earliest date for the site based on diagnostic artifacts is 1886, the mean age range for all artifacts is 1922-1941.

Research Hypothesis 6.1.1.3: Site 5LR9974, the Wathen Ranch and second Stout Post Office dates between ca. 1882, when the post office was move to this location, and the late 1940s, when Horsetooth Reservoir was built.

Results: Confirmed. The Wathen Ranch was established in 1887 and was abandoned by the late 1940s when the Horsetooth Dams and Reservoir were completed.

6.1.2 Problem Domain 2: Site Function

How a site was used may be defined, at least partially, by its location. A quarry—and directly related facilities such as pits, dumps, derricks, and roadbeds—can only be located where suitable rock is found. Associated industrial facilities (e.g., finishing mills, powder and tool sheds, blacksmith shops, crushing plants) are more likely than not located within a short distance of the quarry. Transportation facilities, such as railroads and roads, will also be found near the quarry, so that the quarried stone can be expeditiously transported. Domestic and commercial structures, schools, and government buildings (e.g., a post office) are more likely to be located further away for the health and safety of their residents.

It can be difficult to infer site function based upon the available evidence, i.e., architectural remnants, features, and artifacts. Architectural remains may or may not be present, and even if present, may be deteriorated enough that the original purpose of the building may be difficult to decipher. In a similar fashion, a feature may defy description. More often than not, it is the artifacts to which one turns for interpretation of site function. But, as Carrillo et al. (1993: 126-127) point out, the descriptive attributes of an artifact can thwart any functional interpretations. As much as possible, therefore, the artifacts recovered from a site should be sorted into functional artifact groups. It is recognized, however, that such an assemblage does not include all artifacts ever left at the site, nor is it a simple matter sometimes to ascribe function to an individual artifact, especially if that artifact is fragmentary. With these caveats, Carrillo et al. (1993: 128) define six basic functional groups, which are divided into associated artifact classes, as shown in Table 6-1. It should be noted that cartridges could have been put into the Subsistence category, as did Carrillo et al. (1993: 130), because they were used for food procurement. They can also be used in recreational pursuits, which is how they are defined here. Nails were placed in the Activities category, rather than Architecture, because they can be used for several purposes other than buildings; for example, fences.

Table 6-2 summarizes the functional artifact groups for the three Horsetooth sites. For all three sites, Subsistence artifacts predominate (50.8 percent), followed by Activities (30.7 percent) and Architecture (14.2 percent). The relative frequencies of Household/Domestic, Leisure/Recreation, and Personal items are minuscule (2 percent or less). For Site 5LR9949, the Activities group dominates (44.2 percent), followed by Subsistence (27.0 percent) and Architecture (24.5 percent); the other categories individually comprise about 2 percent or less. These results may be interpreted to mean that Site 5LR9949 had an industrial focus, but that food items were brought to and consumed on the site. At Site 5LR9961, the greatest number (nearly 88 percent) of the artifacts (bottles, cans, and ceramics) are related to subsistence pursuits. This result is not unexpected if the site was used for trash discard. For Site 5LR9974, the Activities group predominates (54.6 percent), followed by Subsistence (23.4 percent) and Architecture (16.2 percent). The relative frequency (2.7 percent) of Household/Domestic artifacts is unusually low, particularly in light of the fact that this site was an active ranch and commercial

establishment (i.e., post office) for several decades. It is quite likely that the artifact sample is not truly representative of the full range of material remains that were left at the site, and may still be present in some unexcavated area of the site.

TABLE 6-1
FUNCTIONAL ARTIFACT GROUPS AND CORRESPONDING ARTIFACT CLASSES

Functional Groups	Functional Classes
Activities	Nails Wire Miscellaneous Metal Transportation Items
Architecture	Hardware Window Glass
Household/Domestic	Household Items
Leisure/Recreation	Cartridges
Personal	Personal Items Coinage Apparel & Accessories
Subsistence	Cans Bottle Glass Ceramics Faunal Remains Floral Remains

TABLE 6-2.
FUNCTIONAL ARTIFACT GROUPS FOR HORSETOOTH SITES.

FUNCTIONAL ARTIFACT GROUPS	SITE NO.			TOTALS	% of TOTALS
	5LR9949	5LR9961	5LR9974		
ACTIVITIES					
Nails	1,064	124	701	1,889	27.3%
Wire	9	7	14	30	0.4%
Misc. Metal	133	15	47	195	2.8%
Transportation Items	0	5	2	7	0.1%
<i>subtotals</i>	1,206	151	764	2,121	30.7%
<i>% of group from all three sites</i>	56.9%	7.1%	36.0%		
<i>% of all groups from same site</i>	44.2%	5.4%	54.6%		
ARCHITECTURE					
Hardware	303	88	168	559	8.1%
Window Glass	366	0	59	425	6.1%
<i>subtotals</i>	669	88	227	984	14.2%
<i>% of group</i>	68.0%	8.9%	23.1%		
<i>% of all groups</i>	24.5%	3.2%	16.2%		
HOUSEHOLD/DOMESTIC					
Household Items	39	72	38	149	2.2%
<i>subtotals</i>	39	72	38	149	2.2%
<i>% of group from all three sites</i>	26.2%	48.3%	25.5%		
<i>% of all groups from same site</i>	1.4%	2.6%	2.7%		
LEISURE/RECREATION					
Cartridges	21	0	6	27	0.4%
<i>subtotals</i>	21	0	6	27	0.4%
<i>% of group from all three sites</i>	77.8%	0.0%	22.2%		
<i>% of all groups from same site</i>	0.8%	0.0%	0.4%		
PERSONAL					
Personal Items	20	0	13	33	0.5%
Coinage	0	0	0	0	0.0%
Apparel & Accessories	36	32	24	92	1.3%
<i>subtotals</i>	56	32	37	125	1.8%
<i>% of group from all three sites</i>	44.8%	25.6%	29.6%		
<i>% of all groups from same site</i>	2.1%	1.1%	2.6%		
SUBSISTENCE					
Cans	111	670	0	781	11.3%
Bottle Glass	479	1,547	252	2,278	32.9%
Ceramics	24	187	13	224	3.2%
Faunal Remains	21	41	43	105	1.5%
Floral Remains	102	0	20	122	1.8%
<i>subtotals</i>	737	2,445	328	3,510	50.8%
<i>% of group from all three sites</i>	21.0%	69.7%	9.3%		
<i>% of all groups from same site</i>	27.0%	87.7%	23.4%		
TOTALS	2,728	2,788	1,400	6,916	
% of TOTALS	39.4%	40.3%	20.2%		100.0%

Research Hypothesis 6.1.2.1: The structural foundations at Site 5LR9949 are the remains of a stone processing facility.

*Results: **Confirmed.*** The layout of the structures on the site, and their proximity to an actual quarry, suggests that the site had more of an industrial focus. The artifact assemblage appears to support this conclusion. The relative high frequency of Subsistence items on the site suggests only that the quarry workers brought food with them as part of their work habits.

Research Hypothesis 6.1.2.2: Few or no domestic artifacts will be found at Site 5LR9949.

*Results: **Confirmed.*** Household/Domestic items are sparse (1.4 percent), as are Personal items (2.1 percent).

Research Hypothesis 6.1.2.3: The majority of the artifacts in the trash dump at Site 5LR9961 will have domestic origins.

*Results: **Partially confirmed.*** Subsistence items comprise the overwhelming majority (almost 88 percent) of the artifacts found at the site. Most of the remaining artifacts are grouped in the Activities category. The data suggest that a variety of items were discarded at the site, but those related to food consumption predominate.

Research Hypothesis 6.1.2.4: The foundations at Site 5LR9974 are the remnants of domestic or commercial structures.

*Results: **Confirmed.*** Building 1 and Building 2 closely match the location and description of the Stone House and Stone Shed, respectively, that are depicted on the historic (1940s) map of the area.

Research Hypothesis 6.1.2.5: Artifacts that are found at Site 5LR9974 will have domestic or commercial origins.

*Results: **Confirmed.*** The preponderance of the Activities, Subsistence, and Architecture artifact groups, accounting for 94 percent of the artifacts, tends to corroborate the interpretation that they have domestic origins. A commercial association is more problematic.

6.1.3 Problem Domain 3: Technology

Quarrying techniques evolved over the decades in this area. Initial procedures were relatively simple, in that after holes were drilled in the rock, wooden wedges (“plugs”) and half-round bars (“feathers”) were driven in to crack the stone into block for further fabrication by hand labor or at a mill. More dangerous, but less time consuming was to fill the drill holes with black powder and blast out the stone into a workable sizes. Besides the safety issues, this technique was less efficient in that it tended to produce more rubble than blocks. Some quarries later adopted the used of a “channeler” in which steam, compressed air, or electricity was used to drive a chisel machine that ran along a two-rail track. Whichever technique was used, other apparatus such as hoist derricks, inclined tramways, and wagons for transport were associated with the quarry.

Research Hypothesis 6.1.3.1: Stone was extracted from the outcrop at Site 5LR9949 using the plug and feather method. Discarded feathers, and possibly plugs, should be found at the site.

Results: Confirmed. No plugs or feathers were found anywhere on the site, but several blocks of stones at the quarry evince drill holes and chisel marks. No evidence of blasting was observed.

Research Hypothesis 6.1.3.2: Masons rough-finished stones in the rooms next to the quarry pit at Site 5LR9949. Fragments of stone should be abundant in these areas.

Results: Rejected. Other than wall fall, no stones were found in Room 1-7 that would suggest that masons used these areas for rough finishing of stone blocks.

Research Hypothesis 6.1.3.3: The base(s) of hoist derricks should be present in the quarry area at Site 5LR9949.

Results: Confirmed. One large (approximately 2 inches in diameter) metal pipe was found embedded in the bedrock in the level quarry work area, while a second metal pipe was found embedded in a large stone block at the base of the rocky talus slope, about 100 ft. south of Room 1. Guy cables may have been attached to these pipes so as to steady the derrick.

6.1.4 Problem Domain 4: Extra-local Relationships

All tools, equipment, and construction materials used at the quarry were, in all likelihood, manufactured outside the Horsetooth valley, in nearby towns such as Fort Collins, Greeley, and Denver, or other areas of the country. Such items would include machinery, parts, tools, and even milled lumber.

Based on manufacturer's trademarks, the origins of selected artifacts can be pinpointed, as described below.

<u>Artifact</u>	<u>Site(s)</u>	<u>Manufacturer's Name(s)</u>	<u>Origin(s)</u>
Ceramics	5LR9949	West End Pottery Co.	East Liverpool, Ohio
Bottle Glass	5LR9949 5LR9961	Hazel-Atlas Glass Co.	Wheeling, West Virginia
		American Bottle Co.	Chicago, Illinois
		Owens-Illinois Co.	Toledo, Ohio
		Diamond Glass Co.	Montreal, Quebec, Canada
		Obear-Nestor Glass Co.	St. Louis, Missouri
		Kerr Glass Mfg. Co.	Chicago, Illinois and Sand Springs, Oklahoma
		Western Glass Mfg. Co.	Denver, Colorado
		Turner Bros. Co.	Terre Haute, Indiana
		Clorox	Oakland, California
Cartridges	5LR9949 5LR9961 5LR9974	Northwestern Glass Co.	Seattle, Washington
		Union Metallic Cartridge Co.	Bridgeport, Connecticut
		Remington Arms Co.	Hoboken, New Jersey
		Peters Cartridge Co.	Kings Mill, Ohio
		Winchester Repeating Arms Co.	Boston, Massachusetts and New Haven, Connecticut

With the exception of the bottle glass from Oakland, Seattle, and Denver, all of the artifacts with trademarks originated either in the Midwest (Illinois, Indiana, Missouri, Ohio, and Oklahoma) or the East Coast (Connecticut, Massachusetts, New Jersey, and West Virginia). A possible international connection is represented by a bottle fragment from Montreal, Canada.

Some of the floral remains recovered from the sites suggest an extra-local connection. The nuts and seeds of sour cherries, watermelon, black walnut, plum, peach, apricot, and pumpkin could have been grown locally. Sweet cherry, walnut, and coconut are non-native species. Wood from Douglas fir and Ponderosa pine could have been harvested locally. The western red cedar planks and the hickory tool handle are clearly not native. Western red cedar grows from Alaska to northern California and from the Pacific Ocean to Montana. Hickory originates in the eastern U.S. It is the hardest, heaviest and strongest American wood and is used for tool handles, furniture, cabinetry, flooring, paneling, wooden ladders, dowels, and sporting goods.

Research Hypothesis 6.1.4.1: The majority of the extra-local items came from nearby towns.

*Results: **Rejected.*** With the exception of at least one bottle that was manufactured in Denver, all of the other artifacts whose origins could be traced came mostly from the Midwest or the East Coast. Several items from the West Coast and Canada are also present. This geographic distribution does not preclude the possibility, however, that these items were shipped by train from these distant locations to a local retailer (e.g., in Fort Collins or Greeley) and then transported to the Horsetooth area by train or wagon.

Research Hypothesis 6.1.4.2: Because of their scarcity, extra-local items would be repaired rather than discarded when they broke or were no longer usable.

*Results: **Unknown.*** No data are available to answer this question.

6.2 FARMING AND RANCHING (1860-1940)

Farming and ranching preceded and followed the stone quarrying activities. The earliest homesteads were established in the early 1870s. The early 1890s witnessed a surge in settlement. These farmers and ranchers used local stone to build substantial homes, raised cows, sheep, and chickens, and grew corn, wheat, garden vegetables, and fruit trees, and produced milk and butter. Given the vagaries of agricultural pursuits, many of the local residents supplemented their income by hauling rock in the quarries and loading railroad cars. Site 5LR9974, the Wathen Ranch and second Stout Post Office, and possibly Site 5LR9961, best represent this theme.

6.2.1 Problem Domain 1: Chronology

As discussed in Section 6.1, the mean age range for all artifacts recovered from Site 5LR9949 is 1922-1941, even though the earliest and latest dates are 1886 and 1949, respectively. The Wathen Ranch was established in 1887 and occupied more or less continuously until the late 1940s when the Horsetooth Dams were completed and the filling of Horsetooth Reservoir commenced.

Research Hypothesis 6.2.1.1: Site 5LR9974, the Wathen Ranch and second Stout Post Office, is one of the oldest sites in the valley. Diagnostic artifacts recovered from the site should be older than the quarries (i.e., post-1880).

Results: Confirmed. The Wathen Ranch dates from 1887 until about 1949, with the period of greatest activity occurring ca. 1895-1920. The quarry site, 5LR9949, was first occupied no earlier than 1905, but the period of greatest activity was 1920-1934.

Research Hypothesis 6.2.1.2: Site 5LR9974 was occupied longer than most other sites in the valley, ca. 1870 until the late 1940s when Horsetooth Reservoir was built.

Results: Unknown. The Wathen Ranch was established in 1887 and was occupied probably until the late 1940s. It is probably not the oldest site in the valley, because homesteads were established in the area in the early 1870s, but it could be the longest continuously occupied location.

Research Hypothesis 6.2.1.3: If the trash dump at Site 5LR9961 was principally associated with farming and ranching in the valley, then the age ranges of diagnostic artifacts should encompass a lengthy period from ca. 1860 until the 1940s.

Results: Confirmed. The age ranges of diagnostic artifacts recovered from the site range from 1886 until 1949, even though the mean age range for all artifacts is 1922-1941.

6.2.2 Problem Domain 2: Site Function

Table 6-2 summarizes the functional artifact groups for the three Horsetooth sites. At Site 5LR9974, the Activities group predominates (54.6 percent), followed by Subsistence (23.4 percent) and Architecture (16.2 percent). The relative frequency (2.7 percent) of Household/Domestic artifacts is unusually low, particularly in light of the fact that this site was an active ranch and commercial establishment (i.e., post office) for several decades.

Research Hypothesis 6.2.2.1: Site 5LR9974 was principally a domestic facility (ranch house) that also served a governmental purpose (post office). Artifacts of a domestic nature should dominate the artifact assemblage, with a smaller number of artifacts that can be linked to its post office function.

Results: Tentatively confirmed. The artifacts are somewhat equivocal about the site function, even though they tend to suggest a domestic function for the site. No artifacts related to the site's use as a post office were found, but this is not too surprising considering that the site was occupied for nearly 40 years after the post office closed.

Research Hypothesis 6.2.2.2: Site 5LR9961 has always been used for refuse disposal. No features or structural remnants will be present.

Results: Confirmed. No features or structures were found at 5LR9961.

6.2.3 Problem Domain 3: Technology

Farms and ranches used distinctly different techniques and tools than did stone quarries. Besides domestic structures, remnants of such structures as barns, sheds, corrals, fences, windmills, and

roads may be present. Relevant artifacts include plowing and harvesting implements, sheep shears, fence mending tools, and blacksmith equipment.

Research Hypothesis 6.2.3.1: Site 5LF9974 is part of the Wathen Ranch and recovered artifacts should reflect this function.

*Results: **Confirmed.*** Historic maps clearly show that a ranch complex, consisting of several buildings (residences, barns, cow sheds, and other outbuildings), as well as roads, fences, and cultivated fields were present at this location. The most abundant artifacts recovered from the site are nails (50 percent) and bottle glass (18 percent), with some window glass (4 percent), miscellaneous metal (3 percent), faunal remains (3 percent), and a few household items (3 percent).

Research Hypothesis 6.2.3.2: If the refuse deposit at Site 5LR9961 is stratified, then it may be possible to discern an evolution in tool types and the use(s) of those tools.

*Results: **Tentatively Confirmed.*** The deposits in the trash dump are stratified, with the oldest artifacts at the bottom of the deposit. Bottle glass, ceramics, and household items do tend to increase in frequency from the bottom to the top of the deposit, possibly representing a population increase in the area.

6.2.4 Problem Domain 4: Extra-local Relationships

It was shown above that those artifacts with trademarks that could be traced to specific regions came almost exclusively from the Midwest and East Coast. Possible connections with the West Coast and Canada are also indicated.

Research Hypothesis 6.2.4.1: Items such as ceramics, cutlery, and specialized tools cannot be manufactured locally and will have been imported. Their frequencies in the artifact assemblage at Sites 5LR9961 and 5LR9974 should measure the strength of these outside connections.

*Results: **Confirmed.*** As described in Section 6.1.4, most of the temporally diagnostic artifacts found at Sites 5LR9961 and 5LR9974 have extra-local origins, mostly the East Coast of the U.S.

Research Hypothesis 6.2.4.2: If the refuse deposit at Site 5LR9961 is stratified, then it may be possible to describe and evolution in the preference for such extra-local items.

*Results: **Rejected.*** The relative frequencies of extra-local artifacts do not obviously change from the bottom to the top of the deposit.

6.3 IRRIGATION (1859-1959)

Efficient transport of water to the farms, ranches, and communities in semiarid eastern Colorado has been a major focus of resident since the area was first settled in the mid-1800s. Before the Colorado-Big Thompson Project was conceived and constructed, from 1937 to 1957, local residents diverted water from mountain streams and dug ditches to convey that water to their farms and ranches. Throughout the recent history, the area has witnessed climatic perturbations, from wet years to droughts, that have dramatically affected the livelihood of the residents.

Construction of Horsetooth Reservoir and other facilities in the Colorado-Big Thompson Project was designed to moderate the most severe fluctuations in runoff.

6.3.1 Problem Domain 1: Technology

Before the Colorado-Big Thompson Project was complete, local inhabitants needed to extract, convey, and store water for personal use, livestock, and crops. Wells, ditches, cisterns, or similar devices would have been built in support of the settlements at Site 5LR9949 and the Wathen Ranch, 5LR9974. Construction of the Horsetooth Dams and Reservoir dramatically altered the relationship between the local residents and water availability. The techniques used to construct these engineering marvels have evolved to some extent since the 1940s. The design and construction of the dams at Horsetooth Reservoir are very similar to today's methods. The major differences are defensive measures, designed to prevent or limit seepage and enhance dam stability, and the type of construction equipment used. Unlike modern dams, the early dams lacked a filter berm and foundation buttresses. Reclamation added these design features to earthen dam projects in the 1960s. The capacity and hardiness of construction equipment has increased dramatically since the Horsetooth Dams were constructed. In the 1940s, a 6-cubic-yard, wire-controlled shovel filled a 22-ton dump truck. Today, a 50-cubic yard hydraulic shovel fills a 320-ton dump truck. A scraper in the 1940s could scrape and haul 15 cubic yards per trip compared to the 54 cubic yards that modern equipment can move.

Research Hypothesis 6.3.1.1: Some type of water storage feature (e.g., cistern) should be present at Site 5LR9949, the stone quarry.

Results: **Confirmed.** A small well was found just grid east of the rooms at the site.

Research Hypothesis 6.3.1.2: The Wathen Ranch (5LR9974) would have required a great deal of water for domestic use, animals, and crops. As such, a system of wells, ditches, or pipes, and storage features, should be present.

Results: **Unknown.** Historic records are mute as to the location of such irrigation and water storage devices, and the excavations identified no such features.

Research Hypothesis 6.3.1.3: The pattern of the late 1940s construction activities will differ from modern construction sites.

Results: **Confirmed.** Dam design features have been enhanced and the capabilities of construction equipment have vastly improved.

Research Hypothesis 6.3.1.4: The pattern for the construction of Horsetooth Reservoir will differ from contemporaneous Reclamation projects due to the distinctive setting of Horsetooth.

Results: **Confirmed.** Much of the rock fill required for the Horsetooth Dams was obtained from historic sandstone quarry waste piles, which were frequent in the region.

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